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BOOK REVIEWS

Antike Technik. Sechs Vorträge von HERMANN DIELS. Leipzig-Berlin: B. G. Teubner, 1914. Pp. vii+140. M. 3.60.

How Plato devised an alarm clock, how the Egyptian priests sold holy water in penny-in-the-slot machines, ancient systems of secret writing, the construction of Greek locks, the formulae for Greek fire, imitation pearls, and purple dye—these are a few of the fascinating things woven together by Professor Diels in the six lectures which are comprised in this booklet on the craftsmanship and science of Greek antiquity. But it must not be imagined from the few sensational citations above that the respected compiler of the *Fragmente der Vorsokratiker* and the *Doxographi Graeci* has written in the spirit or in the style of the Sunday supplement; his essays are, on the contrary, each a valuable and brief epitome of its subject, and the whole an excellent illustration of the way to present classical subjects to modern audiences.

The six lectures bear the following titles: (1) "Wissenschaft und Technik bei den Hellenen;" (2) "Antike Türe und Schlösser"; (3) "Dampfmaschine, Automat und Taxameter"; (4) "Antike Telegraphie"; (5) "Die antike Artillerie"; (6) "Antike Chemie." Of these, the first was delivered before the Marburger Philologenversammlung and was printed in *N. Jahrb. f. d. kl. Alt.*, 1914, XXIII, 1–17; the subject of the second had been handled by the author in his *Parmenides* (1897); the last is enlarged from an address before the Archaeologische Gesellschaft zu Berlin; and chaps. ii–v formed a course of lectures at the Hochschule in Salzburg. As they are now published, the notes and illustrations, including diagrams that fully explain matters that might otherwise be obscure, ought to satisfy the scholar, and were the volume available in English it would no doubt interest scientifically inclined American boys as much as the lectures must have delighted the German lads who first heard them.

To write with precision upon matters such as these is by no means easy. For Greek antiquity found the taint of *banausia* in the activities of craftsmen, even artists and inventors, no matter how much their success was due to scientific thinking and procedure; and living in a society in which the supply of slaves was plentiful and slave-labor cheap, the Greeks were neither personally interested in labor-saving devices nor indeed from a purely economic point of view did they need to be. So only here and there have the names of inventors, or at best more than the mere names, come down to us.

Only a few, and those chiefly men whose contrivances assisted monarchs and generals in their wars, achieved a rather dimly shining halo of fame. Professor Diels is perhaps most interesting when he tries to restore those phases of Greek history which the Greeks did not see fit to write for themselves; that is, in his sketches of Greek engineering, military science, and chemistry.

In the first instance one is brought into the field where the author's word has undisputed weight, that of the pre-Socratics. From the astronomical observations of Thales he passes to Harpalus, another astronomer, who he conjectures may have been the successor of Cleostratus of Tenedos and the man who, from his familiarity with its tides, successfully bridged the Hellespont for Xerxes. He then shows how the application by the Pythagoreans of numerical relations to all lines of human endeavor affected the Polyclitan canon of art, the city-planning of Hippodamus, and the scientific construction of engines of war. It is clear that mechanicians and mathematicians busied themselves with the construction of artillery, and that the weight of the projectile was adjusted to the machine by a mathematical formula; it is not necessary, however, on these grounds to adopt as certain the interesting suggestion that Zopyrus, the inventor of the gastraphetes or cross-bow, is to be identified with the Pythagorean of that name mentioned by Iamblichus. However this may be, it seems likely that artillery first came into use in the time of Dionysius I and that there must have been notable engineers, whose careers are almost wholly unknown to us, in the service of both this king and other great generals. Incidentally, this takes from King Uzziah the credit of having first used artillery; for II Chron. 26:15, the basis of his claim, seems to be of late origin and of no authority for the times of Uzziah.

Ancient chemistry, such as it is, is represented to us by the half-mystical fragments ascribed to Democritus and two books of recipes of a more practical nature found in Egypt. Both types dealt with gold, silver, precious stones, and the purple dye, and the second, Professor Diels argues, since it was intended neither for the general public nor for the legitimate craftsmen, was compiled for the instruction of the elect in the priestly laboratories of Egypt, where imitations so true to nature were produced as to prove a complete deception even to experts—a "blinding" or ἀμαύρωσις, whence the modern term "blend." The word "chemistry" itself is derived by the author from χύμα, "a mass of molten metal," the material with which the alchemist most worked, and "mass" as a physical and chemical term has an interesting derivation from μάζα (Lat. *massa*), in the sense of "dough," and reflecting the old belief that the noble metals put into an alloy had the power of actual quantitative increase, a process that was compared to the raising of dough with yeast.

The other chapters, on locks, telegraphic communication, and mechanical devices, also contain much that is valuable, but are descriptive rather than historical. We note that the hodometer of Hero of Alexandria anticipates our taximeter and that our chocolate-vending machines embody the principle of the Egyptian περιρραντήριον and may even be a direct descendant of that device.

The book, in a word, contains much in little space. It does not exhaustively immolate any one subject, but gives of several the kind of pleasing, thoughtful, and authoritative account that only remarkable scholarship can produce.

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A Short History of Classical Scholarship. By SIR JOHN EDWIN SANDYS. Cambridge: University Press, 1915. Pp. 455. $2.25.

For those who cannot afford his three-volume edition, Sir John Sandys has compressed into one useful volume what he regards as the essential contents of 1,692 pages. He adds the names of certain distinguished scholars, such as Lewis Campbell and Ingram Bywater, who were still alive when the unabridged edition was published. Sandys had to make an anthology from his own work, and no anthologist will satisfy every reader by his selections, or, as in this case, by their scope. He has contrived to keep all that made his review of the earlier ages of classical learning useful and instructive, but in the biographies of more modern scholars he often gives us what we could do without, or too ruthlessly cuts down others. I for one do not care to know that Bekker "did not shine in ordinary conversation," though it might have been noteworthy if we could have been told that he was a brilliant talker; or that Scholefield "readily accepted the work of Bentley and Porson." One remembers how Margaret Fuller said she "accepted the Universe" and Carlyle's comment thereon. Dr. Kennedy's opinion of Scholefield's scholarship is quoted at length and he is allotted 14 lines; Felton, another dead name, 16 lines, while Headlam is dealt with in 7; and Lewis Campbell is dismissed in 3 lines, while the importance of his work for the study of Platonic chronology is not mentioned. Perhaps it is frivolous to point out a certain ambiguity in the statement about Christ (p. 341) that "he was capable of examining in archaeology, and of lecturing in ancient philosophy, besides taking an interest in astronomy." Among "things that might have been put differently" I include also the remark about Haupt (p. 337) that Nettleship attended his lectures, and "then learnt for the first time to appreciate the true greatness of Bentley." In his references to famous books Sandys often gives, even in this volume, what amounts to a critical review of them; hence it would not have been too much to ask for a few more words about Lobeck's *Aglaophamus*, and if Ast's Index to Plato was to be allowed only one epithet by way of description, those who have suffered much from its shortcomings would have called it "inadequate" rather than "celebrated." Under the heading "Literary Discoveries" the